

Surface	K	Position of controls
(b) Aileron .....	$\pm 0.50$	Ailerons at full throw; + moment on one aileron, - moment on the other.
(c) Elevator .....	$\pm 0.75$	(c) Elevator full up (-).
(d) Elevator .....		(d) Elevator full down (+).
(e) Rudder .....	$\pm 0.75$	(e) Rudder in neutral.
(f) Rudder .....		(f) Rudder at full throw.

(c) At all weights between the empty weight and the maximum weight declared for tie-down stated in the appropriate manual, any declared tie-down points and surrounding structure, control system, surfaces and associated gust locks, must be designed to withstand the limit load conditions that exist when the airplane is tied down and that result from wind speeds of up to 65 knots horizontally from any direction.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13089, Aug. 13, 1969; Amdt. 23-45, 58 FR 42160, Aug. 6, 1993; Amdt. 23-48, 61 FR 5145, Feb. 9, 1996]

#### HORIZONTAL STABILIZING AND BALANCING SURFACES

##### § 23.421 Balancing loads.

(a) A horizontal surface balancing load is a load necessary to maintain equilibrium in any specified flight condition with no pitching acceleration.

(b) Horizontal balancing surfaces must be designed for the balancing loads occurring at any point on the limit maneuvering envelope and in the flap conditions specified in § 23.345.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13089, Aug. 13, 1969; Amdt. 23-42, 56 FR 352, Jan. 3, 1991]

##### § 23.423 Maneuvering loads.

Each horizontal surface and its supporting structure, and the main wing of a canard or tandem wing configuration, if that surface has pitch control, must be designed for the maneuvering loads imposed by the following conditions:

(a) A sudden movement of the pitching control, at the speed  $V_A$ , to the maximum aft movement, and the maximum forward movement, as limited by the control stops, or pilot effort, whichever is critical.

(b) A sudden aft movement of the pitching control at speeds above  $V_A$ , followed by a forward movement of the

pitching control resulting in the following combinations of normal and angular acceleration:

Condition	Normal acceleration (n)	Angular acceleration (radian/sec.)
Nose-up pitching .....	1.0	$+ 39n_m + V \times (n_m - 1.5)$
Nose-down pitching ....	$n_m$	$- 39n_m + V \times (n_m - 1.5)$

where—

(1)  $n_m$  = positive limit maneuvering load factor used in the design of the airplane; and

(2)  $V$  = initial speed in knots.

The conditions in this paragraph involve loads corresponding to the loads that may occur in a “checked maneuver” (a maneuver in which the pitching control is suddenly displaced in one direction and then suddenly moved in the opposite direction). The deflections and timing of the “checked maneuver” must avoid exceeding the limit maneuvering load factor. The total horizontal surface load for both nose-up and nose-down pitching conditions is the sum of the balancing loads at  $V$  and the specified value of the normal load factor  $n$ , plus the maneuvering load increment due to the specified value of the angular acceleration.

[Amdt. 23-42, 56 FR 353, Jan. 3, 1991; 56 FR 5455, Feb. 11, 1991]

##### § 23.425 Gust loads.

(a) Each horizontal surface, other than a main wing, must be designed for loads resulting from—

(1) Gust velocities specified in § 23.333(c) with flaps retracted; and

(2) Positive and negative gusts of 25 f.p.s. nominal intensity at  $V_F$  corresponding to the flight conditions specified in § 23.345(a)(2).

(b) [Reserved]

(c) When determining the total load on the horizontal surfaces for the conditions specified in paragraph (a) of this section, the initial balancing loads for steady unaccelerated flight at the pertinent design speeds  $V_F$ ,  $V_C$ , and  $V_D$  must first be determined. The incremental load resulting from the gusts must be added to the initial balancing load to obtain the total load.

(d) In the absence of a more rational analysis, the incremental load due to the gust must be computed as follows